

In the Claims

Claim 1 (original): An atomic layer deposition method comprising utilization of one or both of an electric field gradient and a magnetic field gradient within an atomic layer deposition reaction chamber to align molecules during the atomic layer deposition as at least portions of the molecules are incorporated into a material formed over a semiconductor substrate.

Claim 2 (original): The method of claim 1 wherein a plasma is present in the atomic layer deposition reaction chamber during the incorporation of at least portions of the molecules into the material.

Claim 3 (original): The method of claim 1 wherein the magnetic field gradient is utilized.

Claim 4 (original): The method of claim 1 wherein the electric field gradient is utilized.

Claim 5 (original): The method of claim 4 wherein:

the atomic layer deposition reaction chamber has a lower portion and an upper portion;

the substrate is in the lower portion; and

the electric field gradient is formed by electrically biasing the substrate relative to one or more structures in the upper portion of the atomic layer deposition reaction chamber.

Claim 6 (original): The method of claim 4 wherein:

the molecules are first molecules;

the atomic layer deposition process comprises provision of second molecules into the atomic layer deposition reaction chamber at a substantially non-overlapping time relative to the first molecules and incorporation of at least portions of the second molecules into the material formed over the semiconductor substrate; and

the electric field gradient is removed from within the atomic layer deposition reaction chamber prior to incorporating at least portions of the second molecules into the material.

Claim 7 (original): The method of claim 6 wherein the first molecules are ammonia and the second molecules are SiCl₄.

Claim 8 (original): The method of claim 4 wherein:

the molecules are first molecules;

the atomic layer deposition process comprises provision of second molecules into the atomic layer deposition reaction chamber at a substantially non-overlapping time relative to the first molecules and incorporation of at least portions of the second molecules into the material formed over the semiconductor substrate; and

the electric field gradient remains within the atomic layer deposition reaction chamber during the incorporation of at least portions of the second molecules into the material.

Claim 9 (original): The method of claim 4 wherein:

the molecules are first molecules;

the atomic layer deposition process comprises provision of second molecules into the atomic layer deposition reaction chamber at a substantially non-overlapping time relative to the first molecules and incorporation of at least portions of the second molecules into the material formed over the semiconductor substrate;

the electric field gradient is in a first configuration during the incorporation of at least portions of the first molecules into the material and is in a second configuration, different from the first configuration, during the incorporation of at least portions of the second molecules into the material.

Claim 10 (original): The method of claim 4 wherein:

the molecules are first molecules;

the electric field gradient is in a first configuration during the incorporation of at least portions of the first molecules into the material;

the first configuration of the electric field gradient comprises an increase of the electric field along a first vector within the atomic layer deposition chamber during the alignment of the first molecules;

the atomic layer deposition process comprises provision of second molecules into the atomic layer deposition reaction chamber at a substantially non-overlapping time relative to the first molecules and incorporation of at least portions of the second molecules into the material formed over the semiconductor substrate;

after the incorporation of at least portions of the first molecules into the material, the electric field gradient is changed to a second configuration in which the electric field increases along a second vector different from the first vector; and

the electric field gradient remains in the second configuration during the incorporation of at least portions of the second molecules into the material.

Claim 11 (original): The method of claim 10 wherein an angular difference between the first and second vectors is about 180 degrees.

Claims 12 -34 (canceled).